

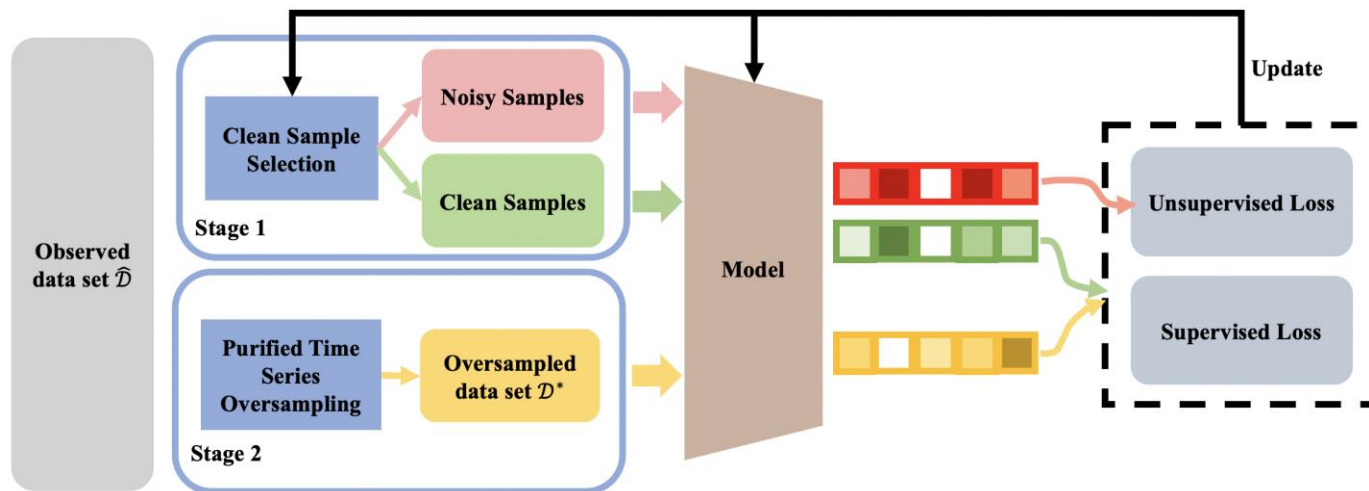
RTS: Learning Robustly from Time Series Data with Noisy Label

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Problems & Ideas

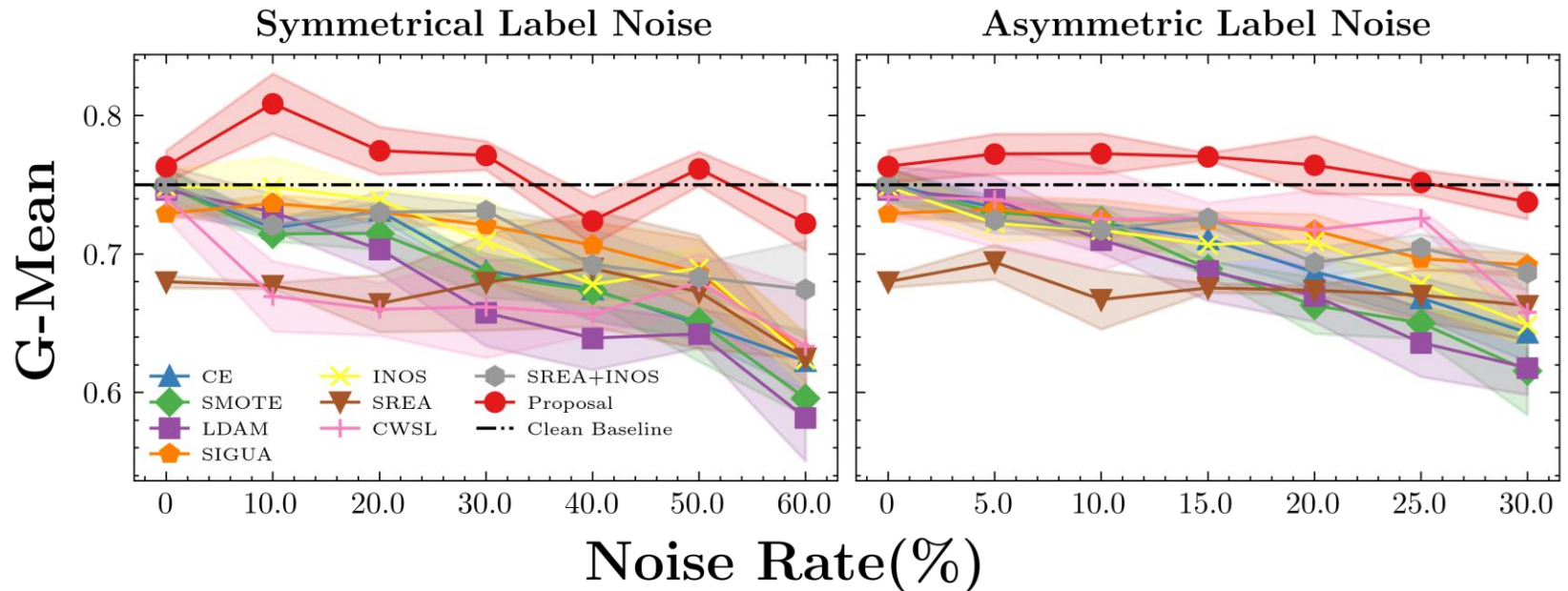
- Challenges of learning from time series data with noisy label:
 - Label noise in time series data misleads the learning process of feature representations, making the representations unreliable.
 - Samples of minority classes are insufficient and assigned with incorrect labels, leading to degraded performance in minority classes.
- Ideas: The label smoothing technique and small-loss criterion are integrated to learn reliable feature representations. A purified oversampling helps to train an unbiased model.



The overview of the proposed RTS approach. In stage 1, we use the label smoothing technique and a small-loss criterion to adaptively learn robust feature representations and identify clean samples. In stage 2, we use purified time series oversampling to generate a balanced dataset for building an unbiased model.

Main Contributions

- Contributions:
 - We study time series classification where labels are inaccurate and classes are imbalanced. This is an important area for real-world applications, but the study is still underexplored;
 - Our framework, called RTS, can effectiveness handle label noise and imbalanced problems in time series data.
 - Extensive experiments on real-world applications and benchmark datasets, as well as, theoretical analysis show the effectiveness of RTS.



The performance on the ECG5000 dataset evaluated with different noise rates. Left: the performance with symmetrical label noise; Right: the performance with asymmetric label noise.